PB85-213973

Superfund Record of Decision (EPA Region 5)
Verona Well Field Site
Battle Creek, Michigan, May 1984

(U.S.) Environmental Protection Agency
Washington, DC

1 May 84

U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-84/009
May 1984

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EPA

Superfund Record of Decision:

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16. ABSTRACT

The Verona Well Field provides potable water to approximately 35,000 people in the City of Battle Creek, water for three food processing industries and for a variety of other commercial and industrial establishments. In 1981, county health officials discovered that water from the Verona Well Field was contaminated with volatile hydrocarbons.

The selected IRM consists of interceptor wells and air stripping to prevent further deterioration of the well field. A carbon adsorption system will be utilized to treat air emissions from the air stripping units. The selected IRM also specifies a 6 MGD increase in water supply capacity to meet estimated peak demand. The total capital costs for the selected alternative is $1,796,000. The annual O&M cost for the project is $470,000.

Key Words: Municipal Water Quality/Supply, Public Exposure, Risk Assessment, Air Stripping, Organic Pollutants, Plume Management, Water Quality Criteria, Air Emission Standards, Air Quality, State Permit, Drinking Water Contaminants

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Verona Well Field Site, MI Contamination media: gw, air Key contaminants: VOCs, hydrocarbons, TCE, PCE		

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RECORD OF DECISION
INITIAL REMEDIAL ALTERNATIVE SELECTION

Site: Verona Well Field, Battle Creek, Calhoun County, Michigan

Documents Reviewed

I have reviewed the following documents describing the analysis of the cost-effectiveness of initial remedial action alternatives for the Verona Well Field:

- Focused Feasibility Study, Verona Well Field, Battle Creek, Michigan, March 28, 1984
- Summary of Remedial Alternative Selection
- Letter from Ronald Skoog, Director, Michigan Department of Natural Resources
- Public comments and recommendations
- Responsiveness Summary

Description of Selected Remedy

° Provide six million gallons/day of new water capacity by drilling wells approximately 3000 feet north of the Verona Well Field

° Implement a barrier system within the Verona Well Field by pumping 1700 gallons/minute from wells 20, 22, 25, 27 and 28.

° Treating the 1700 gpm purge water via air stripping techniques prior to discharge into the Battle Creek River

° Treating the air emissions from the air stripper utilizing activated carbon adsorption

° Operating and maintaining the barrier system for a period not to exceed one year. The State of Michigan will operate and maintain the barrier system thereafter, for a period not to exceed four additional years.

Declarations

Consistent with the Comprehensive Environmental Response Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that providing new wells and implementing a barrier system within the Verona Well Field is a cost-effective initial remedial measure and provides adequate protection of

public health, welfare, and the environment. The State of Michigan has been consulted and agrees with the approved remedy. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period not to exceed one year.

I have also determined that the action has been approved for funding from the Hazardous Substance Response Trust Fund.

The EPA is continuing its remedial investigation/feasibility study of the Verona Well Field to evaluate potential sources of contamination and the hydraulic characteristics of the aquifer in order to evaluate potential remedial actions. If additional remedial actions are determined to be necessary a Record of Decision will be prepared for approval of the future remedial action.

May 1, 1984
Date

Alan Levin (Acting)
Valdas V. Adamkus
Regional Administrator

2.a

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST
CHICAGO, ILLINOIS 60604

REPLY TO ATTENTION OF

MAY 1 1984

MEMORANDUM

SUBJECT: Record of Decision for Initial Remedial Measure at the Verona Well Field Site

FROM: Robert B. Schaefer
Regional Counsel

TO: Valdas V. Adamkus
Regional Administrator

The Record of Decision for the installation of new water capacity and a barrier system as an initial remedial measure at the Verona Well Field Site has been reviewed by my staff. Based upon our review of the Record and supporting documents, I believe that implementation of the remedial measure is a proper exercise of your delegated authority.

cc: Basil G. Constantelos
Director, Waste Management Division

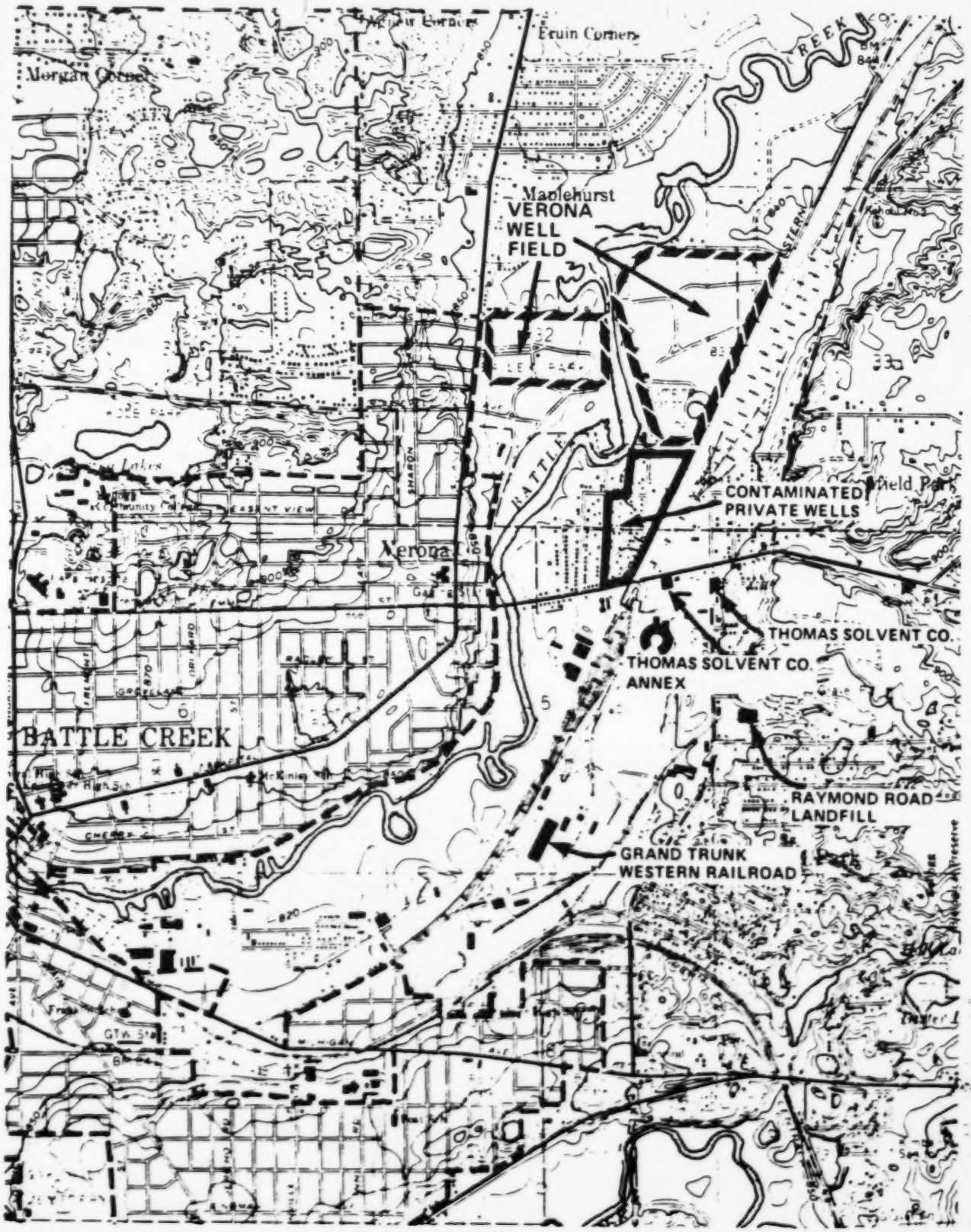

Figure 1
SITE LOCATION
VERONA WELL FIELD

Narrative Summary

Site Location and Description

The Verona Well Field is located approximately 1/2 mile northeast of Battle Creek, Calhoun County, Michigan (see Figure 1). The well field incorporates property on both sides of the Battle Creek River. The area north and east of the well field is essentially rural. Land use to the south and west is light to heavy industrial, with a residential area directly south, and the Grand Trunk Western Railroad marshalling yard adjoining the well field on the east.

The well field consists of three wells west of the Battle Creek River (in Bailey Park), and 27 wells, with a major pumping/water treatment station, east of the river (see Figure 2 for well placement). The Marshall formation is the principal aquifer for the well field. Water transmission through the Marshall formation occurs primarily through fractures in the sandstone of the formation.

The Verona Well Field provides potable water to 35,000 residents of Battle Creek, and part or all of the water supply requirements for three major food processing industries and a variety of other commercial and industrial establishments. A review of the monthly pumpage data for the last two years indicates that the City requires a supply of water equal to approximately 10 MGD (million gallons/ day) on average, with additional supplies needed to meet peak demand periods equalling 19 MGD.

History

During August 1981, while conducting routine testing of private water supplies, the Calhoun County Health Department discovered that the water supply from the Verona Well Field was slightly contaminated with volatile hydrocarbons. Followup testing by the Calhoun County Health Department and the Michigan Department of Public Health (MDPH) revealed that ten of the city's 30 wells contained detectable levels of volatile compounds. The MDPH then began weekly sampling of the well field.

During that same period, the MDPH began sampling private residential wells in the area to the south of the well field. To date, approximately 80 private wells have been found with varying concentrations of contaminants. Several of the private wells have total VOC contamination levels on the order of 1,000 ug/l (micrograms per liter, or parts per billion); the well with the highest level has a dichloroethylene concentration of 3,900 ug/l. EPA implemented a bottled water program for the area residents, during the time a water supply system was being constructed to provide city water to the affected area. The system is now complete and the EPA's bottled water program has been discontinued.

VERONA WELL FIELD

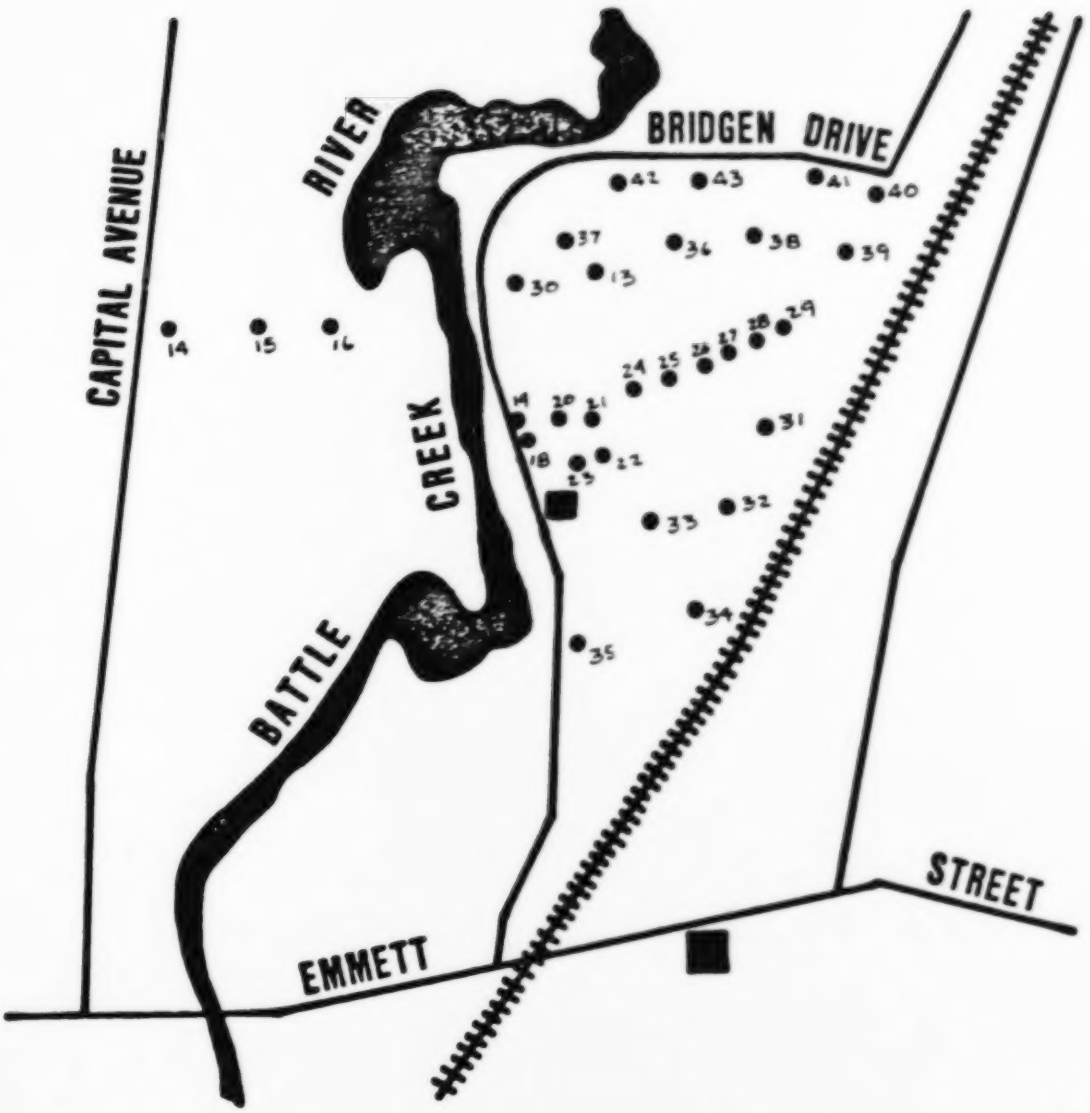

Figure 2

Several studies and investigations have been conducted or are underway in the area:

The Michigan Department of Natural Resources (MDNR) investigated potential sources of the contamination, and identified the Thomas Solvent Company facilities, the Grand Trunk Western Railroad, and the Raymond Road Landfill as possible sources of the volatile hydrocarbons.

The EPA Technical Assistance Team (TAT) conducted a groundwater survey during the spring of 1982, and found that a groundwater divide exists in the upper aquifer near Emmett Street. The TAT study further concluded that the source of contamination was most likely in the vicinity of the Thomas Solvent properties.

The Verona Well Field was listed as a National Priorities List site in July 1982 (Group 4).

The U.S. Geological Survey (USGS) conducted a hydrological investigation under contract with the City of Battle Creek. The study examined the geology and groundwater flow patterns in the vicinity of the Verona Well Field. The USGS is preparing a groundwater flow model to evaluate the effects of pumping Verona wells on groundwater flow.

The U.S. Environmental Protection Agency (EPA) began its remedial investigation during November 1983. The majority of the field work has been accomplished but analyses of the soil and water samples have not been completed.

The State of Michigan filed suit against the Thomas Solvent Company in January 1984. The County Circuit Court subsequently issued an order for preliminary injunctive relief against the firm.

Since the initial discovery of the problem, weekly sampling of individual municipal supply wells by the MDPH has shown steadily increasing levels of contamination in the well field. The City had been able to maintain acceptable quality in the drinking water by blending contaminated water with water from uncontaminated wells. At this time, only three wells remain completely uncontaminated (wells V14, V15, and V16). These three wells are located west of the Battle Creek River in an area called Bailey Park. A majority of the 27 municipal supply wells east of the river have displayed increasing levels of contamination.

Current Site Status

Seven volatile organic chemicals (VOC's) have been consistently found in the well field, five of which are suspected carcinogens. In addition, ten other compounds have been found intermittently in individual wells. Table 1 lists the contaminants and associated risk levels.

The trend in the concentration of contaminants in the well field, shown in Figures 3 and 4, indicates a deteriorating situation. Figure 3 shows the plume as it existed in early 1982. Figure 4 represents the results of sampling at the end of 1983. The plume of contaminanted ground water is clearly moving northward, threating to encompass the entire well field.

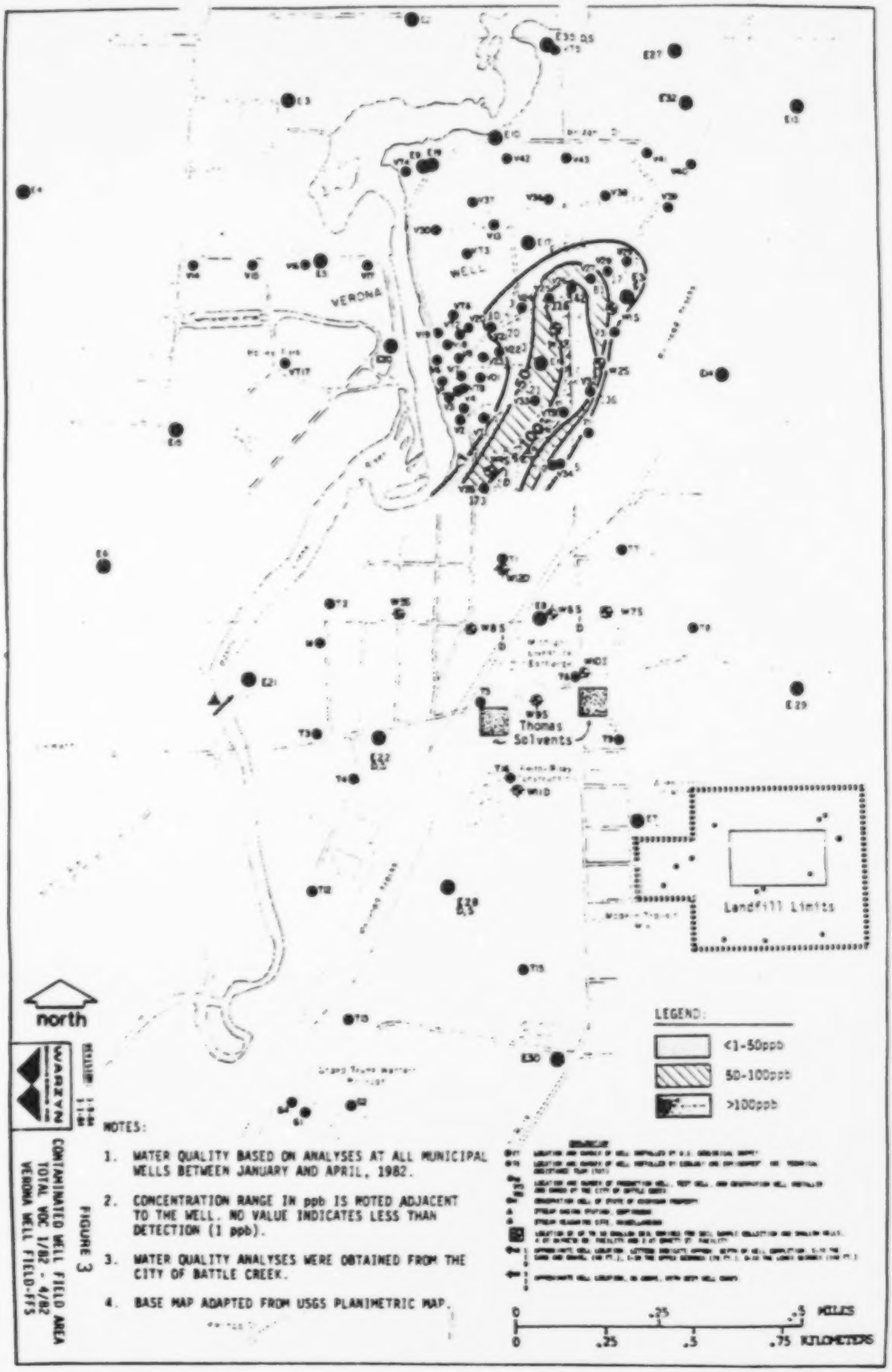
north
WARZYN
VERONA
WELL
Thomas Solvents
Landfill Limits
LEGEND:
<1-50ppb
50-100ppb
>100ppb
NOTES:
1. WATER QUALITY BASED ON ANALYSES AT ALL MUNICIPAL WELLS BETWEEN JANUARY AND APRIL, 1982.
2. CONCENTRATION RANGE IN ppb IS NOTED ADJACENT TO THE WELL. NO VALUE INDICATES LESS THAN DETECTION (1 ppb).
3. WATER QUALITY ANALYSES WERE OBTAINED FROM THE CITY OF BATTLE CREEK.
4. BASE MAP ADAPTED FROM USGS PLANIMETRIC MAP.
0 .25 .5 MILES
0 .25 .5 .75 KILOMETERS

FIGURE 3
CONTAMINATED WELL FIELD AREA
TOTAL VOC 1/82 - 4/82
VERONA WELL FIELD-FFS

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Table 1
CONTAMINANT CHARACTERISTICS

Contaminant	Highest Observed Concentration (µg/l)	Long-Term Health Advisory (µg/l)	Cancer Risk Level 10^{-5} (µg/l)	Cancer Risk Level 10^{-6} (µg/l)
Frequently Detected				
1,1 Dichloroethane (1,1 DCA)	34	-	-	-
1,2 Dichloroethane (1,2 DCA)	8	-	6.0	0.6
1,1,1 Trichloroethane (1,1,1 TCA)	150	1,000	220	22
cis-1,2 Dichloroethylene (cis 1,2 DCE)	229	-	-	-
1,1 Dichloroethylene (1,1 DCE)	11	-	0.34	0.034
Trichloroethylene (TCE)	62	75	28.0	2.8
Perchlorethylene (PCE)	94	70	9.0	0.9
Sporadically Detected				
Methylene Chloride*	5.5	150	1.9	0.19
1,2 Dibromoethane*	3	-	0.55	0.055**
Chloroform*	15	-	1.9	0.19
Benzene*	9	70	6.7	0.67
Ethylbenzene*	5	-	-	-
Toluene*	57	100**	-	-
Xylene*	26	-	-	-
1,2 Dichlorobutane*	detected	-	-	-
Vinyl Chloride*	1	-	10.0	1.0**
trans-1,2-dichloroethylene*	detected	-	-	-

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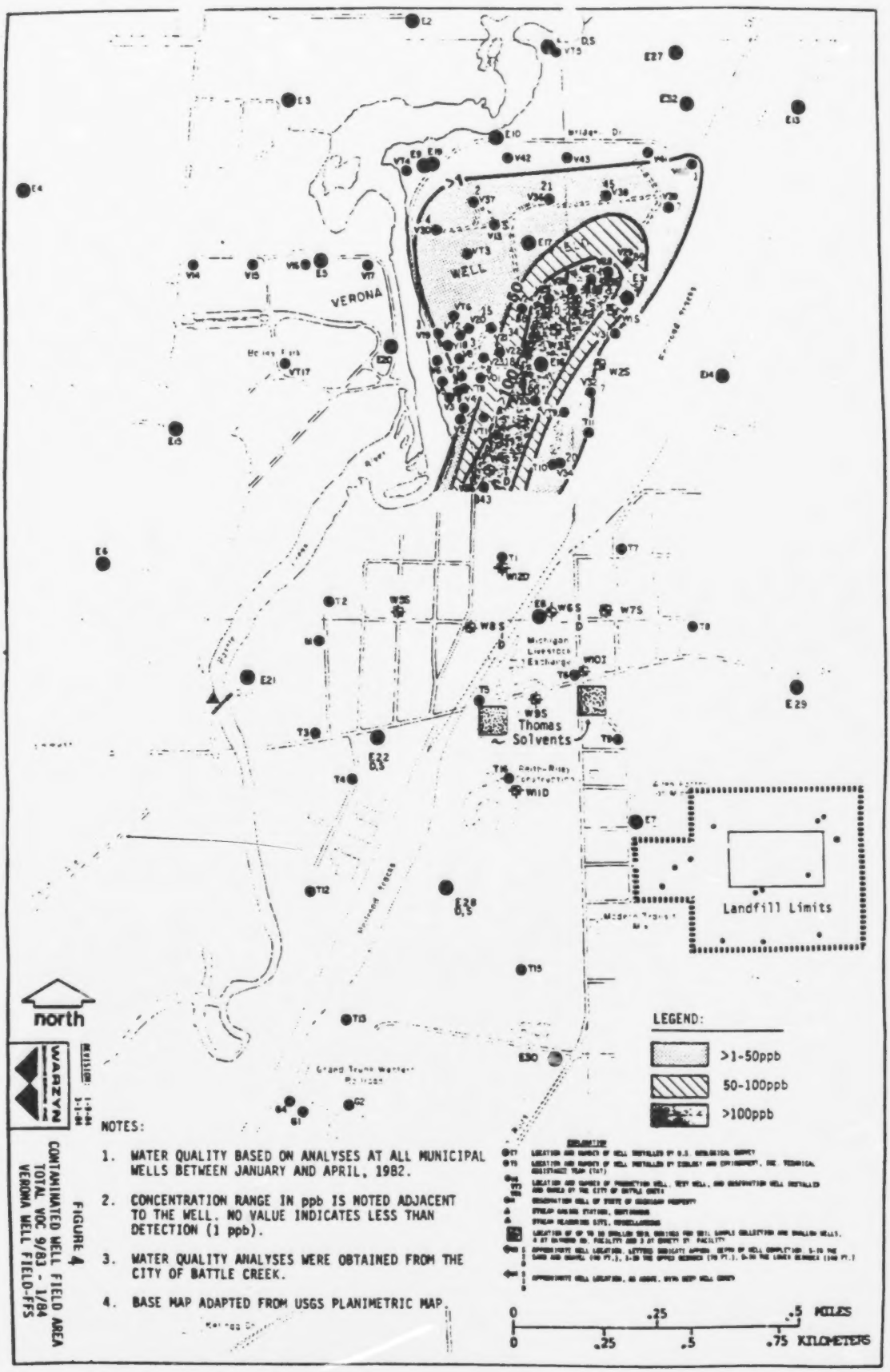
* Sporadic, generally nonrecurring contaminants observed in some Verona wells.

** These levels were established by the National Academy of Sciences. All others were taken from the USEPA and the Cancer Assessment Group.



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3. WATER QUALITY ANALYSES WERE OBTAINED FROM THE CITY OF BATTLE CREEK.
4. BASE MAP ADAPTED FROM USGS PLANIMETRIC MAP.

FIGURE 4
CONTAMINATED WELL FIELD AREA
TOTAL VOC 9/83 - 1/84
VERONA WELL FIELD-FFS

WARZYN

Reproduced from best available copy.

At present, the City must rely on contaminated wells to meet its water needs. Water use was determined through examination of historical pumping rates for 1982 and 1983. The maximum daily demand during the summer months of June, July and August, (1983) averaged 17.2 million gallons/day (MGD) with a peak demand of 18.8 MGD. The average daily demand for those months was 12 MGD. These numbers are significantly higher than the spring, fall and winter pumping rates (Maximum daily demand = 13.9 MGD; Average daily demand = 8.9 MGD).

The Focused Feasibility Study (FFS) evaluated the quality of the water produced when the City pumps 18.5 MGD, the peak summer demand, and assessed the attendant health risks. The FFS examined several possibilities. First it was assumed the plume did not advance any further north and the City pumped the least contaminated wells to meet peak demand. Under this assumption, the finished water presents a 5×10^{-6} risk, based upon EPA's water quality criteria. Since the well field is deteriorating and conditions are not expected to remain the same, this represents the lower bound of the risk.

To assess a more likely set of conditions, it was assumed that the plume moves 400 to 600 feet to the north, (that the water quality now found in well 28 moves into well 38, etc. Under these conditions, the water supply will present a 5×10^{-5} risk according to EPA's water quality criteria. Because of the unpredictability of the situation, the actual risk could be even higher.

It is important to note that two Thomas Solvent Company facilities located approximately 1/2 mile upgradient of the well field contain high levels of soil and ground water contamination. Analyses of water samples taken from monitoring wells located at each facility show the following levels of contaminants:

1,1,1 TCA	up to	3,500 mg/l
TCE	up to	44,000 mg/l
PCE	up to	56,000 mg/l
1,2 DCA	up to	2,200 mg/l

The continued deterioration of the well field poses an unacceptable threat to human health. As a result, action is necessary to protect human health and to minimize the spread of contaminants.

Enforcement

Current State and Federal enforcement activities are focused on two identified potentially responsible parties (PRP's), Thomas Solvent Company and Grand Trunk Rail Systems. Both PRP's declined to conduct the RI/FS in April 1983, and both declined, in April 1984, to undertake the immediate removal action at the Verona Well Field (installation of a temporary purge system).

In February 1984, Thomas Solvent Company (Thomas), a formulator of solvents and hazardous waste transporter, was ordered by EPA (unilateral section 106 Administrative Order) to purge an immiscible layer of contaminants from ground water beneath the Company's main facility. Thomas voluntarily undertook action and purged 500 gallons of contaminated water. The layer of contamination was not extensive; however, periodic purging is required, and continues.

Table 2

INITIAL SCREENING OF WATER SUPPLY ALTERNATIVES

Screening Criteria

Alternative	Ability to Protect Public Health	Time Required to Implement	Relative Cost	Complexity	Environmental Impact	Community Impact	Result of Initial Screening
Abandon Well Field for New Supply							
Surface Water Supply	Good	1 year	High	Moderate	Low	Low	Eliminated--extended implementation time
Adjacent Water System	Good	1 year	High	Moderate	Low	Low	
New Well Field	Good	1 year	High	Low	Low	Low	
Use Clean Wells, Supplement With New Supply[1]							
Surface Water Supply	Good	6-12 months	Moderate	Moderate	Low	Low	
Adjacent Water System	Good	6-12 months	Moderate	Moderate	Low	Low	Eliminated--inferior to the adjacent new wells, especially in implementation time.
New Wells at Remote Location	Good	6-12 months	Moderate	Moderate	Low	Low	
6 mgd--Adjacent New Wells	Good	3-4 months	Moderate	Low	Low	Low	Consider further
12 mgd--Adjacent New Wells	Good	3-4 months	Moderate	Low	Low	Low	Consider further
Use Existing Wells Only[1]							
Bottled Water/Home Treatment	Moderate	1 month	High	High	Low	High	Eliminated
Conservation	Poor	1 month	Low	High	Low	High	Eliminate--impractical a stand-alone alternat
Treat at Well Field for Drinking Water	Good	3-6 months	High	High	Low	Low	Consider further

[1] Requires the use of blocking wells to protect existing water supply

/CVR91/059

DRAFT

In January 1984, the Michigan Attorney General filed a civil complaint for injunctive relief against Thomas to remediate soil and ground water contamination at both Thomas facilities upgradient of Verona Well Field. An order has been entered in favor of the State. Thomas subsequently filed a Chapter 11 petition under the Bankruptcy Code placing the Company's viability as a responsible party in question. The State has asked EPA to consider Fund-financed source control measures at the Thomas facilities. This request is undergoing review in the Region.

Grand Trunk is the landowner of one of Thomas' facilities, and owner/operator of a marshalling yard east of the well field. EPA has issued Grand Trunk a request for information concerning operations at the marshalling yard, a possible source of contamination at the well field. A civil action will be referred to the Department of Justice if the information is not readily forth coming.

Specific actions against the PRP's to compel their performance of the immediate removal and initial remedial measures have not been taken because the nature of the problem at the well field dictates that EPA act with dispatch (and not experience delays created by prolonged negotiations or litigation).

Alternatives Evaluation

During the initial phase of the feasibility study, remedial options were screened according to the following factors: 1) ability to protect human health; 2) time required for implementation; 3) relative cost; 4) complexity; 5) environmental impact; and 6) community impact. Eleven options were considered.

Table 2 summarizes these options and presents the results of the initial screening process. The time required for implementation was an important screening factor because it is likely that the increased stress imposed on the aquifer during the peak summer months will accelerate the migration of the contaminant plume northward, further contaminating all of the wells east of the River.

After the screening, three alternatives were judged to meet the objectives of the project and were evaluated further:

Alternative #1 - Treat contaminated water from a barrier well system to meet the City's water supply demands.

Alternative #2 - Develop 6 MGD capacity in new wells north of the contaminated well field. Install a barrier well system to intercept the plume and discharge the contaminated water to Battle Creek River.

Alternative #3 - Develop 12 MGD capacity in new wells far to the north of the well field. Install a barrier well system to intercept the plume and discharge the contaminated water to the Battle Creek River.

Barrier Well System:

All three alternatives evaluated after the initial screening require the installation of a barrier system within the well field to block the spread of contamination, since they each depend on the use of existing wells to meet some, or all, of the City's water needs. The FFS examined possible locations for this barrier system and reviewed several options for disposing of the pumped water.

The study indicates that pumping 1,700 gallons/minute from wells 20, 22, 25, 27 and 28, would constitute a feasible and cost-effective barrier, for the following reasons: 1) it is located at the current boundary of the plume; 2) it provides sufficient pumping capacity to block the migration of contaminants; 3) it can operate at the lowest practical pumping rate to minimize treatment costs; and 4) it utilizes existing wells and pumps. No other existing well locations offer all of these advantages, and the cost of drilling new barrier wells is prohibitive.

Alternative 1:

Alternative 1 is designed to use the water pumped from the barrier well system as part of the potable supply. The contaminated water will require treatment to remove a high percentage of the pollutants before it would be of potable water quality.

Several different treatment configurations are possible for treating ground water contaminated with volatile organic compounds. These include coagulation/precipitation, chemical oxidation, biological oxidation, membrane separation, stripping with air and/or steam, and granular or powered activated carbon adsorption. In most cases where contamination is limited to VOC's the selection narrows quickly to air stripping or granular activated carbon adsorption. Other methods have been shown to be either ineffective or too costly for use in this application.

The FFS examined the costs and effectiveness of 1) direct carbon treatment; 2) air stripping; and 3) a combination of the two processes. Of the three options, air stripping is the least costly. Table 3 summarizes the estimated costs to remove 93% of the least volatile pollutant and 99% of the remaining pollutants. These removal efficiencies are necessary to ensure adequate quality for potable use.

Table 3

Cost for Alternative #1 with Different

Treatment Configurations

	Direct Carbon Adsorption	Air stripping with Emission Control	Carbon Adsorption After Air Stripping
Capital Cost	2,230,000	1,091,000	2,230,000
Annual O&M	3,628,000	876,000	2,458,000
Present Worth (5 years)	15,983,000	4,412,000	13,532,000

The air stripping option includes costs to control air emissions of the contaminants. Air stripping is designed to remove VOC's from water by transferring them to an air stream, resulting in an air emission of more than 13 lbs/day of VOC's in this particular application.

There is concern that the proposed treatment system will present a threat to public health, given the fact that five of the VOC's to be emitted are carcinogenic, and the close proximity of the emissions source to the 56,000 residents in the Battle Creek area. Region V Air Management Division staff modeled the emissions to assess risk, and established the risk to be at the 1×10^{-6} level. Given the uncertainties regarding the inhalation toxicities of these chemicals, and the predictive capabilities of the model, the risk may be higher.

Michigan State law requires that any new source of volatile organic compounds be treated with Best Available Control Technology. This rule is incorporated in the State Implementation Plan prepared in compliance with the Clean Air Act and is a federally enforceable State Environmental requirement.

Treatment and control of the VOC emissions with best available Control Technology is recommened as part of the remedy because such control is necessary to ensure that the Superfund remedy does not represent a potential threat toto public health and to comply with State and Federal programs implementing the Clean Air Act.

Alternatives 2 and 3:

Alternatives 2 and 3 both require discharge to the Battle Creek River. The FFS examined the need for treatment prior to discharge.

The EPA has not yet established water quality criteria for these chemicals due to the inadequacy of the data base. However, direct discharge of two of these compounds (1,1 DCE and PCE) would exceed 10^{-5} risk levels established by EPA to protect human health from potential carcinogenic effects of exposure via ingestion of water and contaminated aquatic organisms. In addition, the MDNR developed water quality limits for the Battle Creek River, a warm-water fishery and significant recreational resource. The State's limits considered chronic risks to aquatic life and 10^{-5} risks via ingestion of aquatic organisms. The direct discharge of 1,1,1 TCA and PCE would exceed these State limits. As a further consideration, the State of Michigan requires Best Available Technology (BAT) treatment for compounds that have been shown to be carcinogenic, in conformance with State efforts to implement the Clean Water Act. For these reasons, (BAT) treatment prior to discharge is considered essential for these two alternatives.

Air stripping is again the least cost treatment option for removing 90% of the pollutants in the ground water. A lower percent removal is acceptable for Alternatives 2 and 3 because the water is not to be used for drinking water purposes.

Table 4 shows the costs of treating the ground water pumped from the barrier well system with air stripping, prior to discharge to the Battle Creek River. Costs are shown both with and without an emission control system to prevent the discharge of volatile organic compounds to the atmosphere. Two emission control systems were evaluated. The first is a regenerable system in which a facility is built to regenerate the spent carbon on-site. The second is a non-regenerable system in which the spent carbon is replaced.

Table 4

Cost to Treat River Discharge
Alternatives 2 & 3

		Air Stripping with Emission Control	
	Air Stripping w/o Emission Control	Regenerable Carbon System	Non-regenerable Carbon System
Capital Cost	$478,000	$ 905,000	$ 696,000
Annual O&M	70,000	286,000	451,000
Present Worth (5 years)	$743,000	$1,989,000	$2,405,000

Air emission controls are considered essential for the same reasons as described for Alternative 1. Table 4 indicates that the two emission control methods would have similar costs. The non-regenerable system would be less complex and could be implemented in a shorter time frame; therefore, it is recommended.

The development of additonal wells to supplement the City of Battle Creek's supply is a component of both Alternatives 2 & 3. For Alternative 2 an additional 6 MGD would be provided and for Alternative 3 an additional 12 MGD would be provided. The total cost of these two alternatives is shown in Table 5:

Table 5

Costs for Alternatives 2 & 3

	Alternative 2	Alternative 3
Capital cost for barrier well treatment	$ 696,000	$ 696,000
Capital cost for new wells	1,100,000	2,800,000
Annual O&M for barrier well treatment	470,000	470,000
Present worth (5 years)	3,578,000	5,278,000

Summary:

Each of the three alternatives evaluated is technically feasible. All three would require at least 3 months for implementation and all three were judged to be equally low in potential for environmental impact.

Alternative 1 would be the most complex to implement; would be costly; would be the least likely to prevent the further migration of contaminants, and would provide the least reliability for the City's water supply.

Alternative 3 provides capacity in excess of that needed to meet the City's water demands; is more costly, and requires the acquistion of new property; but it is judged to present the lowest risk of spreading contamination further.

Alternative 2 provides sufficient capacity to meet the City's water needs; is the least costly, and is judged to present little risk for spreading the contamination further into the well field. As a result, Alternative 2 is recommended as the most cost-effective remedial action.

Summary of Costs

	Alternative 1	Alternative 2	Alternative 3
Capital Cost	1,091,000	1,796,000	3,496,000
Annual O&M	876,000	470,000	470,000
Present Worth (5 years)	4,412,000	3,578,000	5,278,000

Community Relations

Copies of the FFS were made available to the community on March 29, 1984. Five locations served as repositories within the community: Battle Creek City Hall, Pennfield and Emmett Township Halls, Springfield City Hall and Willard Library. The EPA held a press conference on March 29 to announce the availability of the study and the commencement of the two week public comment period. EPA also placed an advertisement in the community's daily newspaper regarding the public comment period and schedule for a public meeting.

The public meeting was held on April 5, 1984, at the McQuiston Learning Center, Battle Creek. Approximately 100 residents attended the meeting. Representatives of the EPA, State and local governments were present. The EPA presentation explained the purpose of the FFS, analyzed the alternatives considered, explained the alternative recommended by EPA, and answered questions regarding the project. The majority of the public comments received at the meeting supported Alternative 3. Other comments related to technical questions regarding well placement and construction, cost-sharing, and general exhortations to resolve the problems at the well field. The EPA also received a petition signed by over 3,000 residents asking for Alternative 3, and several other written comments.

The public comment period ended April 12, 1984. The responsiveness summary is attached.

Consistency With Other Environmental Laws

The proposed action will not require on-site treatment, storage, and disposal of hazardous wastes. Therefore, there are no issues involving the consistency of on-site actions with RCRA. Some alternatives include the discharge of the water pumped from the barrier well system to the Battle Creek River. The water will be treated as part of those alternatives to remove 90% of the contaminants present. This discharge will meet the technical requirements of the Clean Water Act on discharges to surface water because the discharge will be treated with Best Available Technology to meet ambient standards.

Similarly, some alternatives include airstripping of contaminants from the water and have a potential air emission. These emissions will be treated to remove the pollutants before they are discharged. This, too, complies with the provisions of the Michigan State Implementation Plan.

Recommended Alternative

The National Oil and Hazardous Substances Contingency Plan (NCP) [40 CFR Part 300.68(j)] states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial measure which the agency determines is cost-effective (i.e. the lowest cost alternative that is technologically feasible and reliable) and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, or the environment. Based on the evaluation of the cost and effectiveness of each proposed alternative, the comments received from the public and the MDNR, and State and Federal environmental requirements, the following alternative has been determined to be cost-effective as defined by the NCP:

- Provide six million gallons per day of new water capacity by drilling wells approximately 3000 feet north of the Verona Well Field.
- Implement a barrier system within the Verona Well Field by pumping 1700 gallons/minute from wells 20, 22, 25, 27 and 28.
- Treating the 1700 gpm purge water via air stripping techniques prior to discharge into the Battle Creek River.
- Treating the air emissions from the air stripping utilizing activated carbon adsorption.

The recommended action is considered an off-site remedial action as defined in section 300.68(e) of the NCP. The objective of the action is to mitigate against the continued spread of the contaminant plume and provide sufficient supplies of water to meet the City's estabilshed needs, until such time that final remedial measures may be implemented. The RI/FS currently underway will examine appropriate final response actions.

The evaluation of alternatives, as summarized earlier, determined that 6 MGD new capacity was more cost-effective than the 12 MGD alternative. The recommended barrier system location and proposed treatment options are also shown to be the least-cost, reliable options. We have determined that implementation of this alternative will effectively mitigate damage to and provide adequate protection of public health, welfare, and the environment.

The capital cost for this alternative is estimated to be $1,796,000. The operation and maintenance costs are estimated to be $470,000 per year, for a period not to exceed five years. The present worth value for the selected alternative is $3,578,000.

Operation and maintenance (O&M) activities will be required to maintain the recommended barrier system. The estimated annual O&M costs include:

° Electric power @ 4¢/kwh	$ 21,000
° Laboratory Costs (4 samples/month - $250/sample)	12,000
° Operating labor (20hrs/week @ $15/hr)	16,000
° Maintenance & supplies	5,000
° 30% contingency	16,000
Cost of air stripping	$ 70,000
° Carbon replacement @ $1.50/lb	$263,000
° Additional electric power	10,000
° Operating labor	20,000
° 30% contingency	88,000
	$381,000
Pumping purge wells	19,000
Total	$470,000

The barrier system is to be maintained for a period of five years. We recommend that EPA fund 90 percent of the O&M costs for a period not to exceed one-year after the completion of construction. The Michigan Department of Natural Resources (MDNR) will then assume all O&M costs for the 5-year life of the project. The MDNR is requesting the necessary funding from the State legislature.

Schedule

Approve Remedial Action (sign ROD)	4/30/84
Award Superfund State Contract for Construction	4/30/84
Complete Design	5/11/84
Start Contruction	5/11/84
Complete Construction	7/6/84

Future Actions

A remedial investigation/feasibility study is underway. Phase I investigation activities are substantially complete, and Phase II work will begin within two months. We expect substantial progress on the feasibility study by fall 1984.

The proposed initial remedial measures are intended to stabilize conditions at the Verona Well Field until a final remedy is selected and implemented.

COMMUNITY RELATIONS RESPONSIVENESS SUMMARY
VERONA WELL FIELD
BATTLE CREEK, MICHIGAN

INTRODUCTION

This "Community Relations Responsiveness Summary" documents citizen concerns and issues raised during the planning and preparation of the focused feasibility study for initial remedial measures at the Verona Well Field, Battle Creek, Michigan. It also documents, for the public record, the U.S. Environmental Protection Agency's (USEPA) response to the comments presented during the public comment period on the feasibility study.

CONCERNS RAISED DURING REMEDIAL PLANNING

Since October, 1983, the USEPA has met frequently with residents and local officials regarding the volatile organic chemical (VOC) contamination at the Verona Well Field. The USEPA conducted a public meeting regarding the remedial investigation/feasibility study in November, 1983, and met with residents at a League of Women Voters meeting, and in four informal small group meetings. The Remedial Project Manager, Jonas A. Dikinis, and the Community Relations Coordinator, John Perrecone, have maintained a continuing dialogue with residents, area businessmen, and local officials regarding the Agency's response activities.

There are several issues of particular concern in the community:

1. First and foremost, the residents desire a clean water supply. The community accepted blended water containing low levels of VOC's, but has expressed increased concern over the continued spread of the contaminants. Battle Creek residents have expressed their displeasure with the slow pace of governmental response to the problem.

2. Food processing industries represent a significant portion of the City's industrial base. These industries require a clean water supply, and are dependent on governmental action to mitigate the threats to the area's ground water.

3. Pennfield and Emmett Township residents living south of the well field have experienced personal hardship due to the contamination in the area. These residents relied on private wells for their water supply and, in some cases, have consequently ingested much higher levels of contaminants than the general population. They have since been placed on the City's water supply system, but have deeply held concerns regarding possible health impacts as a result of their past, and continuing, exposure. In addition, these residents maintain a high level of concern regarding any potential health impacts that subsequent remedial actions may present (e.g. disturbing contaminated soils, air emissions from air stripping, etc.).

The Agency considered these broad concerns in its decision to undertake a focused feasibility study to evaluate possible initial remedial measures, and in the development and selection of alternatives. The Agency believes

that initial remedial measures are necessary to prevent the continued spread of contaminants and provide an adequate potable water supply, until the remedial investigation/feasibility study is finished and the final remedy implemented. The Agency recommends initial remedial measures which would not have intrinsic human health and environmental impacts.

CONCERNS RAISED DURING THE COMMENT PERIOD

The Focused Feasibility Study (FFS) was completed on March 28, 1984. Copies of the FFS were made available to the community on March 29, 1984. A public meeting was held at the McQuiston Learning Center on April 5, 1984, to present the FFS and solicit public comment. The public comment period closed on April 12, 1984.

Approximately 100 residents attended the public meeting. After the Agency's presentation, 17 attendees asked questions and provided comments regarding the proposed alternatives. The Agency subsequently received 16 written statements regarding the proposed initial remedial measures. Written comments include a resolution pased by the Battle Creek City Commission, a petition signed by 3,183 residents, and letters from the Vice Mayor, the City's consulting firm, a past City Commissioner, a neighborhood planning council, a Springfield City Council member, an area business, the State and County Departments of Public Health, a local well driller, and several area residents.

ISSUE: 6 MGD versus 12 MGD Capacity

The majority of the comments (oral and written) presented to the Agency expressed a strong desire for 12 MGD capacity versus 6 MGD (Alternative 3 versus Alternative 2, respectively). Comments in favor of Alternative 3 referenced several factors:

1. COMMENT: Alternative 2 places a greater reliance on the purge system to block the contaminant plume, which implies a degree of increased risk of spreading the contamination further north.

   RESPONSE: The Agency relied on the best professional judgment of geologists employed by USEPA and its outside consultants, in the formulation of the alternatives. The Agency strongly believes that Alternative 2 does not present a significant risk of spreading the contaminants beyond the well field. In fact, ground water modeling performed during the FFS indicates that Alternative 2 would create a ground water divide north of the well field which would serve to contain the contaminants within the well field. Should the barrier system fail entirely to block the contaminant plume, Alternative 3 would present a greater risk of spreading the contamination much further north. On the other hand, the Agency recognizes that continued pumping of wells immediately north of the barrier system (within Verona Well Field) would increase the stress on the aquifer and may cause some limited movement of contaminants into the pumping wells. This concern is addressed in detail in the following section.

2. COMMENT: Alternative 3 would require less blending of contaminated water to meet the City's water supply requirements.

RESPONSE: The Agency recognizes the residents' concern regarding the continued blending of contaminated water to meet the City's water supply requirements. The USEPA and other regulatory agencies have taken the position that no concentration of a suspected carcinogen can be proven "safe". However, attaining an absolute zero concentration is impractical in most cases, and all three alternatives proposed in the FFS require some level of blending. At present, the City must rely on contaminated wells to meet its water needs. The City's water requirements were determined through examination of historical pumping rates for 1982 and 1983. The maximum daily demand during the summer months of June, July and August (1983, a high water use year) averaged 17.2 million gallons per day (MGD) with a peak demand of 18.8 MGD. The average daily demand for those months was 12 MGD. These numbers are significantly higher than the spring, fall and winter pumping rates (maximum daily demand = 13.9 MGD; average daily demand = 8.9 MGD). Alternative 2 would provide 6 MGD of clean water from new wells, combined with 4.3 MGD of clean water from the Bailey Park wells, for a total of 10.3 MGD uncontaminated supply. This means that the City can meet its average daily demand for 9 months of the year without blending contaminated water.

Blending will be necessary during the three summer months. Alternative 2 could provide a maximum of 20 MGD with an expected cancer risk of approximately one in 10 million, orders of magnitude below established action levels. As mentioned earlier, if we assume that the barrier system may fail, the expected risk will approach one in 100,000 for a period of several days during the summer months. The resulting lifetime risk is not significant.

The Agency recognizes, however, residents' concerns regarding potential health risks, and will consider adding additional capacity should the barrier system prove unreliable. At present, Alternative 2 can provide for the City's water needs at risk levels far below those considered unacceptable. For this reason, the Agency does not believe that an additional 6 MGD capacity, proposed under Alternative 3, is necessary nor cost-effective.

3. COMMENT: Alternative 3 would provide capacity for future economic growth.

RESPONSE: This argument implies that Alternative 3 will provide more water than is immediately required to meet the City's present needs. The Agency can utilize the Hazardous Substance Response Trust Fund to implement only those measures found necessary to protect human health and the environment. Fund monies are not to be used to pay for expansion or long-term growth needs.

4. COMMENT: Alternative 3 could serve as a permanent remedy should the Agency not fund subsequent remedial actions.

   RESPONSE: The Agency has committed to, and implemented, a remedial investigation/feasibility study to determine the appropriate actions for a final remedy of the contamination problem in Verona Well Field. The response proposed in the FFS is intended only as an interim action to limit exposure to hazardous substances until such time that a final remedy is implemented. The Agency understands the community's desire for a permanent remedy; however, we have not yet developed the data base necessary to fully evaluate alternatives for a final remedy. Given the uncertainties regarding the contamination problem, it is prudent to limit the scope of interim measures, rather than to commit to additional measures which may only serve to exacerbate the problem.

Given the fact that no technical deficiencies were noted for Alternatives 2, the Agency believes that Alternative 2 will suffice to block the spread of contamination, and is sufficient to meet the City's established water supply needs on an interim basis. The Agency will consider providing additional capacity should the barrier system fail.

ISSUE: Location of New Wells

Six commentors questioned the proposed locations for the new supply wells, raising several issues:

1. COMMENT: There is an operating oil well at Site A (the proposed location of wells under Alternative 2).

2. COMMENT: There is a PBB feed burial site within one-half mile of both sites A and B.

3. COMMENT: New wells should be drilled as far away from Verona Well Field as possible (preferably at higher elevations and west of the Battle Creek River).

   RESPONSE: The Agency considered several locations for new water supplies. The FFS concluded that other sources could probably be developed to supply the required flow, but would require the construction or expansion of supporting facilities and would present uncertainties regarding available supplies and required levels of treatment. Keeping in mind that the goal of the initial remedial action is to provide acceptable water supplies by July, 1984, it would not be possible to drill new wells far from the existing pumping station/treatment plant, and still meet the July deadline. Furthermore, it would be necessary to acquire property, conduct hydraulic tests, and analyze the water to ensure acceptable quality. Site A was selected as an appropriate location for new wells since the City already owned the property, and the wells could be drilled and connected to the water system within three months. During the preparation of the FFS, the City drilled test wells at Site A, and conducted the necessary pump tests and water quality analyses (in

cooperation with the Michigan Department of Public Health) to provide assurance that the ground water at Site A would be acceptable as a potable water source. No contamination has been found at Site A. The Agency would most certainly select a different location for supply wells if Site A was shown to be unsatisfactory. Again, it is important to note that the proposed action is designed as a interim measure. It is quite possible that different well locations would be utilized in the implementation of a potential final remedial action.

ISSUE: The Proposed Barrier System

COMMENTS: Most commentors supported the concept of a barrier system to block the spread of the contaminants. However, two residents questioned whether the barrier system would draw increased concentrations of VOC's into the well field from upgradient sources, and whether that would ultimately compromise the effectiveness of the system.

RESPONSE: The Agency concedes there is the possibility of drawing additional contaminants into the well field as a result of the proposed continuous purging activities. For this reason, the Agency has supported the State in its efforts to obtain injunctive relief against the Thomas Solvent Company.

ISSUE: Source Control Measures

COMMENTS: Three residents specifically requested the Agency to undertake source control measures at the two Thomas Solvent Company facilities upgradient of the well field.

RESPONSE: The Agency is aware of the high concentrations of VOC's in the soil and ground water at the Thomas Solvent facilities. Since there are no barriers to retard the migration of these substances into the Verona Well Field, it is appropriate to consider source control remedial actions. The Agency will discuss such measures with the State.

ISSUE: Water Conservation

COMMENTS: The resolution passed by the City Commission included a committment to prepare and implement a voluntary water conservation program this summer. Several commentors also advocated water conservation.

RESPONSE: The Agency wholeheartedly supports water conservation as a significant adjunct to the proposed initial remedial measures.

Individual commentors raised several other issues: 1) sealing all area wells properly, and cementing abandoned wells to preclude vertical migration of contaminants; and 2) compensating homeowners for damages incurred as a result of the contamination.

RESPONSE: While the Agency believes these comments have merit, they involve issues beyond the statutory authorities granted to the Agency